

Appl. No. 09/730,813

Reply to Office Action of January 7, 2004

REMARKS

The final Office Action was issued on pending claims 1-3 and 5-19. Claims 1, 5-12 and 19 stand rejected. Claims 2, 3 and 13-18 stand withdrawn from consideration. In this Response, no claims have been amended, cancelled or added. Thus, claims 1, 5-12 and 19 are pending and under consideration.

Applicants invite the Examiner to call Applicants' Representative to discuss any issues with this application.

New Matter Objections and Rejections

At page 2 of the Office Action, the amendment to the specification submitted July 1, 2003 was objected to under 35 U.S.C. § 132 as containing new matter. At page 2 of the Office Action, claims 1, 5-12 and 19 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement by containing new matter. Page 3 of the Office Action includes a response to Applicants' arguments submitted November 5, 2003. Applicants respectfully disagree.

The specification objection and the claim rejections are based on the same assertion. The Office Action asserts that the opening width W of the plasma nozzle being set in the range of $10 \text{ mm} < W \leq 100 \text{ mm}$ and more preferably set in the range of $10 \text{ mm} < W \leq 20 \text{ mm}$ is new matter. More specifically, the Office Action asserts that the lower end of the range being 10 mm is new matter even though the 10 mm endpoint is unquestionably within the range of 1 mm to 100 mm described in the specification as originally filed.

The amendments narrowed the claimed ranges within the ranges described in the specification as originally filed. The amendments did not broaden the claimed ranges. Indeed, the Office Action does not assert that the amended lower endpoints are outside of the ranges disclosed in the application as originally filed. Accordingly, the narrowing amendments - which are clearly within the disclosed ranges - do not include new subject matter.

The Office Action at page 3 argues that the application as originally filed disclosed the lower end of the range required for generating hollow discharge to be 1 mm and never disclosed that the minimum opening width required for generating hollow discharge must be more than 10

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mm. Based on that argument, the Office Action concludes that the amended lower endpoints of 10 mm is new matter. The rejections should be withdrawn for several reasons.

The Office Action Misstates Claim Text

Claim 1 does not recite "the minimum opening width required for generating hollow discharge must be more than 10 mm." (emphasis supplied) Rather, claim 1 recites "an opening width $W(1)$ of the smallest portion on the plasma nozzles is set in a range satisfying $10\text{ mm} < W(1) \leq 100\text{ mm}$." Nowhere does claim 1 recite a "minimum opening width required." Applicants' invention, as claimed in claim 1, pertains to a range of the opening width of the plasma nozzle in which hollow discharge is generated. The Office Action confuses Applicants' claimed lower end of a range of the opening which produces hollow discharge with a "required minimum" opening to produce hollow discharge. Claim 1 is not limited to a "minimum opening width required for generating hollow discharge" and thus, the rejections are misplaced and should be withdrawn.

The Office Action Improperly Relies on an Incorrect Test for New Matter

The Office Action seems to be using a test for determining whether there is new matter by looking for the exact numerical value (10 mm) in the original application. However, that is not the test for determining whether the amendments include new subject matter and comply with 35 U.S.C. § 112, first paragraph.

In order to comply with the written description requirement of §112, first paragraph, the specification "need not describe the claimed subject matter in exactly the same terms as used in the claims; it must simply indicate to persons skilled in the art that as of the [filing] date the applicant had invented what is now claimed." *All Dental Prodx LLC v. Advantage Dental Products Inc.*, 64 USPQ2d 1945 (Fed. Cir. 2002); *Eiselstein v. Frank*, 52 F.3d 1035, 1038, 34 USPQ2d 1467, 1470 (Fed. Cir. 1995) (citing *Vas-Cath*, 935 F.2d at 1562, 19 USPQ2d at 1115, and *In re Wertheim*, 541 F.2d 257, 265, 191 USPQ 90, 98 (CCPA 1976)).

In the present application, the original application clearly indicates to persons skilled in the art that hollow discharge is generated with "an opening width $W(1)$ of the smallest portion on the plasma nozzles is set in a range satisfying $10\text{ mm} < W(1) \leq 100\text{ mm}$ " as claimed in claim 1. Applicants' specification as originally filed teaches one of ordinary skill in the art the objective

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of providing hollow discharge to improve the surface treatment of the substrate. Applicants' specification as originally filed further teaches one of ordinary skill in the art how to achieve that objective. Examples of numerical ranges for the diameter of recesses or nozzles to generate hollow discharge for improving surface treatment of the substrate are provided to the skilled artisan by Applicants' application. Applicants' teachings unquestionably include the range of 1 mm to 100 mm for the nozzle to generate hollow discharge. Applicants' teachings also unquestionably include narrower ranges to produce hollow discharge because the original application expressly states the narrower range of 1 mm to 20 mm. One of ordinary skill in the art armed with Applicants' objective of producing hollow discharge, Applicants' plasma nozzle opening in a starting range of 1 mm to 100 mm, Applicants' teachings of narrower ranges, and Applicants' further teachings of how to produce hollow discharge would be able to achieve a plasma nozzle set in the ranges of $10 \text{ mm} < W \leq 100 \text{ mm}$ and $10 \text{ mm} < W \leq 20 \text{ mm}$. Accordingly, Applicants' application indicates to the skilled artisan the claimed range and complies with the requirements of §112, first paragraph. Thus, the amendments do not include new subject matter and the rejections should be withdrawn.

MPEP §2163.05, III. Range Limitation and *In re Wertheim* do not Support the Rejections

The Office Action cites MPEP §2163.05, III. Range Limitation and *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976) in support of the rejections. However, the Office Action's reliance on those citations is misplaced. *In re Wertheim* (which is cited in MPEP §2163.05, III. Range Limitation) found new matter when a range was amended to be broadened, not narrowed. The range in *In re Wertheim* was amended from "25%-60%" to "at least 35%." That amendment was determined to be new matter because the "at least 35%" had no upper limit and was thus broader than the disclosed upper limit of 60%. In the present case, Applicants have not broadened the range beyond the originally disclosed range, as was the new matter problem in *In re Wertheim*. Rather, Applicants' amendment is within the originally disclosed range. Accordingly, the Office Action's reliance on MPEP §2163.05, III. Range Limitation and *In re Wertheim* is not well founded and the rejections should be withdrawn.

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The Office Action Misunderstands Hollow Discharge Generation at the Lower Endpoint

The Office Action at page 3 asserts that Applicants' previous response indicates that the hollow discharge is not generated at the nozzle diameter of 5mm with the frequency power in the RF region, and argues that the previous amendment is considered as new matter because the amendment is inconsistent with the original application. However, as described below, if the high-frequency power is settled with the frequency over the VHF region, the hollow discharge can be generated with the opening diameter of 5mm.

As mentioned in Applicants' previous response, there exists the plasma sheath layer, in which no ion having a plus charge can not exist, around the high-frequency electrode. Therefore, in order to excite high-density hollow plasma, the diameter of the opening of the nozzle should have at least a double size with respect to the thickness of the sheath layer. In case of the high-frequency excitation plasma, the thickness of the sheath layer is about 2 to 3mm in 13.56 MHz of the RF region and about 0.5 to 1.0 mm in 100MHz of the VHF region. Thus, in order to generate the "hollow discharge", the lower limit of the diameter (W) of the opening of the nozzle, when the margin is 50%, is about 10mm in the RF region and about 3mm with the frequency of high-frequency power in the VHF region. That is, when the diameter (W) of the opening of the nozzle is 3mm, the hollow discharge is not generated when the frequency of high-frequency power is within the RF region, but the hollow discharge can be generated when the frequency power is within the VHF region.

As described in Applicants' previous response, the assumption for generation of hollow discharge relies on the frequency of the power. Under 13.56MHz (RF discharge region) mentioned as one example in the previous response, the hollow discharge is not generated with the opening diameter of 5mm. However, as also referred to in the previous response, in the band of frequency over about 100MHz (VHF region), the hollow discharge is generated with the opening diameter of 1mm.

Turning to Takahashi et al., Takahashi et al. does not focus attention on the generation of hollow discharge or its effective utilization. Furthermore, Takahashi et al. does not disclose or suggest Applicants' claimed invention. Even further, Takahashi et al. does not disclose or suggest generating hollow discharge at a nozzle opening greater than 10mm. Again, Takahashi et al. does not have an objective of generation of hollow discharge or its advantageous utilization.

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Provisional Request for Withdrawal of the Finality of the Office Action

Applicants strongly believe the application is in condition for allowance and a Notice of Allowance should be issued in response to this Response. However, if a Notice of Allowance is not issued, Applicants request that the finality of the Office Action be withdrawn. The finality should be withdrawn because the Office Action was based on improper support for the assertions made therein. MPEP §2163.05, III. Range Limitation and *In re Wertheim* do not support the assertions made in the Office Action as discussed above. Applicants should not be burdened with an Office Action made final under those circumstances.

CONCLUSION

For the foregoing reasons, Applicants submit that the patent application is in condition for allowance and request a Notice of Allowance be issued.

Respectfully submitted,

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